

CLAIMS

What is claimed is:

1. An apparatus for use in deflecting loads,
comprising:

5 a door aperture formed in a facesheet, wherein the
door aperture has an edge;

a first load deflector having a length, wherein the
first load deflector is curved along at least a portion of
its length; and

10 the first load deflector is secured with the
facesheet such that the first load deflector is proximate
the door aperture with a middle portion of the curved load
deflector is closest to the aperture such that the first
load deflector deflects a load.

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2. The apparatus of claim 1, wherein the first
curved load deflector comprises a majority of layers having
orientations along the load being deflected.

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3. The apparatus of claim 2, further comprising:

a patch bonded with the facesheet proximate the door
aperture such that the patch at least surrounds the door
aperture.

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4. The apparatus of claim 3, wherein the patch has
four quadrants and each quadrant is formed of at least one
ply, each of the four plies having an orientation, wherein
a first and third quadrant have a first orientation, and a
second and fourth quadrant have a second orientation where

the second orientation is different than the first orientation.

5 5. The apparatus of claim 3, wherein the first and
third plies have an orientation that is at about a positive
45 degrees with respect to the axial load prior to
deflection by the first curved load deflectors, and the
second and fourth plies have an orientation that is at
about a negative 45 degrees with respect to the axial load
10 prior to deflection by the first curved load deflectors.

6. The apparatus of claim 3, wherein the patch is
formed of at least two plies stacked and bonded with each
other on the facesheet such that both plies surround the
15 door aperture.

7. The apparatus of claim 6, wherein the patch has
an orientation that is not parallel with respect to the
axial load prior to deflection by the first curved load
20 deflectors.

8. The apparatus of claim 7, wherein the
orientation of the patch is at about 45 degrees with
respect to the axial load prior to deflection by the first
25 curved load deflectors.

9. The apparatus of claim 3, wherein the patch extends over and covers the first curved load deflector.

10. The apparatus of claim 9, further comprising a
5 second curved load deflector secured with the facesheet proximate the door aperture and on an opposite side of the door aperture than the first curved load deflector; and
the second load deflector having a length, wherein the second load deflector is curved along at least a
10 portion of its length such that the second load deflector deflects the axial load.

11. The apparatus of claim 1, further comprising a second curved load deflector secured with the facesheet
15 proximate the door aperture and on an opposite side of the door aperture than the first curved load deflector; and
the second load deflector having a length, wherein the second load deflector is curved along at least a portion of its length such that the second load deflector
20 deflects the axial load.

12. An apparatus for use in reinforcing an access door, comprising:

a first load deflector positioned on a facesheet
25 proximate an access door aperture;

the first load deflector having a first length such that the first load deflector is curved along at least a portion of its length;

the first curved load deflector having a first

defined curvature such that the first defined curvature of the first load deflector is proportional to a size of the access door aperture;

5 a second load deflector positioned on the facesheet proximate the access door aperture;

the second load deflector having a second length such that the second load deflector is curved along at least a portion of its length; and

10 the second curved load deflector having a second defined curvature such that the second defined curvature of the second load deflector is proportional to the size of the access door aperture.

13. The apparatus of claim 12, wherein the first and second curved load deflectors have first and second thicknesses, respectively, wherein the first and second thicknesses are proportional to design loads and are dependent on the defined curvatures of the first and second load deflectors, respectively; and

20 the defined curvatures of the first and second load deflectors are further dependent on the thicknesses of the first and second load deflectors, respectively.

14. The apparatus of claim 13, wherein the first and second curved load deflectors have widths, wherein the widths are dependent on the size of the access door aperture and are dependent on the defined curvatures of the first and second load deflectors, respectively, and further dependent on the thicknesses of the first and second load

deflectors, respectively;

the defined curvatures of the first and second load deflectors are further dependent on the widths of the first and second load deflectors, respectively; and

5 the first and second thicknesses are further dependent on the widths of the first and second load deflectors, respectively.

15 15. The apparatus of claim 12, wherein the first and second curved load deflectors have widths, wherein the first and second widths are proportional to the size of the access door aperture and are dependent on the defined curvatures of the first and second load deflectors, respectively; and

15 the defined curvatures of the first and second load deflectors are further dependent on the first and second widths of the first and second load deflectors, respectively.

20 16. The apparatus of claim 12, further comprising: an overlay patch secured with the facesheet and surrounding the access door aperture.

25 17. A method of manufacturing a spacecraft fairing, comprising:

assembling a fairing;
cutting an access door aperture through the fairing;
securing a first load deflector with the fairing proximate the access door, wherein the first load deflector

has a first curvature; and

securing a second load deflector with the fairing proximate the access door, wherein the second load deflector has a second curvature.

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18. The method of claim 17, further comprising:
determining a first and second positioning of the first and second curved load deflectors, respectively; and
determining a first and second thickness of the

10 first and second curved load deflectors, such that the first and second thicknesses are dependent on the first and second positioning, respectively.

19. The method of claim 17, wherein securing the
15 first load deflector comprises stacking a first plurality of layers such that a majority of the first layers have an orientation perpendicular to an expected load; and

wherein securing the second load deflector comprises stacking a second plurality of layers such that a majority
20 of the second layers have an orientation perpendicular to the expected load.

20. The method of claim 19, further comprising:
securing a patch with the fairing such that the
25 patch surrounds the aperture, wherein the patch has an orientation, and the securing of the patch includes securing the patch such that the patch orientation is not parallel with the expected load.